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Recent Developments in Canadian Canola/Rapeseed.

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A - 1990 CANOLA CROP DEVELOPMENTS

In the summer of 1990, Canada seeded 2.63 million hectares of canola, despite pessimism last spring following two years of poor weather and crop conditions. Total acreage was below the 2.904 million hectares and 3.63 million hectares seeded in 1989 and 1988, respectively. The seeding of canola was delayed in many areas due to cool weather and poor soil moisture conditions. However, total yields and production were good due to favourable weather conditions during the growing season. In 1990 yields averaged 1240 kg/hectare in comparison to 1070 kg/hectare in 1989. The total production in 1990 was approximately 3.3 million tonnes. In 1990, canola acreage was represented primarily by five spring cultivars including two *B. napus* varieties (Westar and Legend) and three *B. campestris* varieties (Tobin, AC Parkland and Horizon).

The seed quality of western Canadian canola is determined by the Grain Research Laboratory of the Canadian Grain Commission. Cooler summer temperatures and timely rains resulted in an improvement in the quality of the 1990 crop compared with last year's crop. The oil content of top grading 1990 western Canadian canola is, on average, 41,4% which is 1% higher than the 1989 crop but lower than the 10-year average (1980-89) of 42,4%. The oil content of 1989/90 export cargoes averaged 40,5% and had increased to 41,1% by October of 1990. Protein levels of top grade 1990 canola averaged 38,7%, lower than the level of 1989 (40,1%) but higher than the 10-year average of 38,2%. The protein content of 1989/90 export cargoes averaged 38,8% and increased to 39,5% by October, 1990. The average level of aliphatic glucosinolates in the dry, oil-free seed residue was 20 micrmoles/gram in the 1990 crop, significantly lower than the 1989 final estimate of 25 micromoles/gram and the ten year average of 27 micromoles/gram. On average, *Brassica napus* varieties had lower levels of glucosinolates than *Brassica campestris* varieties.

In the 1990 crop, the erucic acid levels were 0,6% of the total fatty acid composition which is lower than the 10-year average of 0,8%. The levels of the saturated fatty acids, palmitic and stearic, remain below 6%. In general, *Brassica napus* varieties appear to be slightly higher than *Brassica campestris* varieties in saturated fatty acids. The level of free fatty acids in western Canadian canola returned to normal for the 1990 harvest after having been unusually high for the 1989 crop. Composite samples of 1990 top grade canola seed averaged levels of free fatty acids in the range of 0,3% to 0,6% compared with 0,5% to 1,5% in 1989.

B - CANOLA/RAPESEED BREEDING DEVELOPMENTS

Breeding for specific modifications of the fatty acid composition of *Brassica* oils is on-going in Canada. Plant breeders have developed cultivars with the low linolenic characteristic (< 3%). Research directed towards improving the agronomic performance of the low linolenic cultivar, Stellar, developed by Dr. Baldur Stefansson of the University of Manitoba is continuing. The University of Manitoba is the only public breeding progam in Canada which is developing this cultivar. Pilot plant processing studies, funded by the Canola Council of Canada, have shown these oils to have improved stability under accelerated storage conditions. The hydrogenation time required to produce a liquid frying fat was reduced by 39% in comparison to traditional oil from the cultivar, Westar. The low linolenic acid canola oil also exhibited significantly less oxidation than oil from Westar. Recent research in France which compared the room odor of low linolenic oil to that of oil from Westar and a French rapeseed has confirmed the Canadian observations (Prevot et. al. 1990 JAOCS, Vol. 67, No.3: 161-164). The development of off-odours in the low linolenic oil was significantly lower than the other two oils, and the difference persisted through eight fryings. The scores of the low linolenic canola oil were comparable to

those obtained with sunflower oil. In 1990, contract production and commercial extraction of the low linolenic cultivar, Stellar, was undertaken to provide oil for further research studies. Specifically, projects to assess the nutritional properties of low linolenic canola oil as well as the sensory and quality characteristics of this oil in snack foods and baked products are in the planning stages with funding to be provided by the Canola Council of Canada.

Canadian breeding programs are also concentrating on increasing oleic acid to higher than 90% in combination with lowered saturates (< 3%) specifically for use in the frying oil market. Allelix Crop Technologies, now a subsidiary of Pioneer Hi-Bred International, and Agrigenetics in the U.S. have recently reported the development of mutant strains of *B. napus* canola that produce seed oil with over 80% oleic acid. High palmitic strains are also being developed for contract production to provide oil for the manufacture of 100% canola margarines and shortenings. Breeding efforts are also underway to develop lines with erucic levels of greater than 60% for industrial purposes.

Several breeding programs, including those at the Saskatoon Research Station, the Beaverlodge Research Station and the University of Alberta, are developing canola quality *Brassica juncea*. Under western Canadian conditions, *B. juncea* has shown improved seed yield, greater drought and heat tolerance, and resistance to blackleg and pod shattering in comparison to the other *Brassica* oilseeds. These institutions are making good progress and it is estimated that suitable material will be available to producers in approximately four years. Three different herbicide resistant transgenic *B. napus* canolas were field-tested in 1990. The source of this material includes Roundup resistant plants from Monsanto, Basta- or Ignite-resistant strains from Hoechst, as well as sulfonylurea-resistant material from DuPont. In addition to these transgenic herbicide-resistant plants, Allelix Crop Technologies have developed and submitted for official testing, a mutant line that is also resistant to the sulfonylureas. Of considerable interest is the development of regulations that will permit transgenic strains to advance from isolated small plot trials to seed production in larger fields, so that the required product evaluation can be carried out and product's safety as a food and feed demonstrated.

Several new canola cultivars of both *B. napus* and *B. campestris* have been registered for use in Canada in 1990. A main criterion for many of these spring cultivars is their improved resistance to the disease, blackleg *(Leptosphaeria maculans* or *Phoma lingam)*. The virulent form of this disease continues to spread and increase in severity over much of the western Canadian production region. In order to reduce the spread of this disease in Alberta, all seed moving from infected areas into the province of Alberta, by law, must be treated with the appropriate fungicide. *Alternaria* disease has been on the increase over the last few years, particularly in the western province of Alberta. Research is on-going to reduce the susceptibility of canola cultivars to these diseases. In the area of hydrid development, a number of hybrid cultivars are expected to enter the Canadian market in 1991 and 1992 and will be based either on the polima CMS system or a self-incompatibility (SI) stystem.

C - CANOLA COUNCIL OF CANADA RESEARCH PROGRAMS

The Canola Council of Canada co-ordinates research programs in the areas of canola utilization, varietal development and agronomy, for the Canadian canola industry in addition to its programs of market development, crop production and public awareness. Of the Canola Council's total funds, approximately 47% is being spent on canola research.

The Canola Council currently provides three specific sources of research funding including the Canola Utilization Assistance Program (CUAP) and the Canola Varietal Development Program (CVDP) which are directed and administered by the Research and Technical Committee, and the Canola Agronomic Research Program (CARP) which is directed by the Crop Production Committee. The research programs of the Canola Council are supported jointly by the industry and by the Canadian government. Industry funds are collected by a voluntary levy from crushers and exporters and government funds are secured by either grant or contract.

The CUAP provides funding for research that addresses the opportunities and constraints for canola products in the marketplace. Research projects which will ultimately improve the utilization of canola seed, meal and oil are considered for funding. Investigations are conducted at universities, private laboratories, and Agriculture Canada Research Stations across Canada. Currently, improving the economics of canola meal through dehulling is a significant priority in the CUAP. Other areas of interest include processing technologies to improve the quality of canola oil and meal, by-product utilization, alternative uses for canola oil, meal and seed and improvements in the nutritional characteristics of canola oil and meal.

The CVDP is a research program co-ordinated by the Canola Council to support the development of superior canola cultivars through traditional breeding techniques and biotechnology. Research is conducted at Agriculture Canada Research Stations and universities across Canada. Other breeding programs exist, particularly in the private sector, but the CVDP and the Canola Council assist to establish and co-ordinate breeding priorities for the entire industry. Research priorities for the CVDP are established annually by the Canola

Council's research committees. The breeding for canola variety characteristics related to increases in both percent protein and percent oil, while improving seed yield, has been identified as a high priority for the canola industry.

Projects that have been recently funded in the CVDP address the development of canola cultivars with characteristics including: cultivars with unique quality, specifically low linolenic acid; yellow seeded *B. napus;* blackleg resistant *B. napus;* and *B. campestris* cultivars with resistance to white rust, root rot and blackleg diseases.

In Canada, new cultivars available to producers must be registered with Agriculture Canada after three years of testing in co-operative yield, quality and disease trials. Of the five new cultivars registered in Canada in 1990, three were developed at breeding institutions funded by the Canola Council of Canada. Newly registered spring *B. napus* cultivars include the triazine tolerant varieties Stallion and AC Tristar, both possessing improved yields and oil content; AC Excel, a high yielding cultivar with improved oil and protein levels and disease resistance and Bounty with improved yield and disease resistance. The *B. campestris* cultivar, Eclipse is characterized by improved yield, oil and protein content.

In the area of agronomic research (CARP), the Canola Council of Canada provides funding assistance for research designed to improve the protein and oil content and average yields of western Canadian canola thereby reducing the unit cost of production. The Canola Council of Canada has recently established Canola Production Centres in a number of locations throughout western Canada. The purpose of these centers is to demonstrate practical canola production technology at the farm level.

D - EIGHTH INTERNATIONAL RAPESEED CONGRESS

Saskatoon, Saskatchewan, in Western Canada, is the site for the Eighth International GCIRC-Rapeseed Congress to be held July 9th to 11th, 1991. The theme of the Congress "Rapeseed in a Changing World" will be addressed by three keynote speakers, Dr. Alex McCalla, Dr. Gerhard Rőbbelen and Mr. Roy Carr. Approximately 160 papers will be presented in oral session and over 300 will be displayed as posters. Sessions include breeding, agronomy, physiology, processing, chemistry, nutrition and economics. Rapporteurs have been secured to provide summaries of each technical session. Arrangements have been made to hold agronomy and analysis workshops on canola at the University of Saskatchewan in Saskatoon prior to the Congress. A number of pre- and post-Congress tours have been planned to provide delegates with the opportunity of seeing more of Saskatchewan and western Canada and learning more about the Canadian canola industry. The Congress promises to be very educational as well as entertaining. Canada is proud to host this important event and welcomes delegates to Saskatoon in 1991 !